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Regional Southeastern Fishes Council Reports

Southeastern Fishes Council

Southeastern Fishes Council Treasurer's Report, April 2001

Checking Account Balance, 3 April 2001		$3,767.69
Dues and Contributions, 21 March 2000 through 3 April 2001:		
Dues	$4,039.00	
Button sales (old buttons)	$200.00	
Sale of SFC *Proceedings* back issues	$12.50	
Ear-marked* contributions	$250.00	
*for the Warren et al. *Fisheries* publication)		
TOTAL		$4,641.50
Expenditures, March 2000 through 3 April 2001:		
Proceedings # 40, printing cost	$2,410.44	
Proceedings # 40, postage	$264.00	
Proceedings # 41, printing cost	$1,656.78	
Proceedings # 41, postage	$205.70	
TN Secretary of State (annual report)	$20.00	
Council of Aquatic Sciences (annual dues)	$100.00	
Returned check & fee	$25.00	
TOTAL:		$4,656.92
Checking Account Balance as of 21 March 2000:		$3,767.69
Paine Webber Cash Fund as of 29 December 2000:		$3,250.37
Reported Fund, 31 December 1999	$3,067.76	
Earned interest and adjustments, 1998	$182.61	
Total Assets		$7,018.06

Notes:
Membership on 21 March 2000 was 170 individuals or organizations, distributed as follows:

Paid through 1997:	7
Paid through 1998:	14
Paid through 1999:	28
Paid through 2000:	64
Paid through 2001	52
Paid through 2002 and lifetime members:	8

Respectfully submitted,
Peggy W. Shute

Regional SFC Reports

REGION I - Northeast

The fishes unit at the North Carolina State Museum of Natural Sciences is plugging along and attempting to weather the state's massive budget shortfall. The struggle to curate and data base the tremendous backlog of collections which accrued from the combination of the UNC Institute of Marine Science, Duke U., and several other collections over the past few years continues, as well as trying to keep abreast of day-to-day acquisitions and requests. The most recent sizeable acquisition was Rudy Arndt's Stockton State University collection of fishes from New Jersey and other areas. With this accession added to previous, NCSM now has among the strongest representations of fishes from the middle Atlantic states, particularly New Jersey, Maryland, North and South Carolina, as well as West Virginia. The data base is fully modified and operational. Fish folks are especially proud of the NCSM drainage hierarchy (for U.S. & portions of other regions) data base and taxonomic data base which are linked to cataloging for quality control. Data based lots are approaching four thousand. Only perhaps another 80,000 or more to go! The outcome of an NSF proposal to support data basing fishes and other collections at NCSM is being anxiously awaited.

The outcome of the funding request is especially important as the fishes unit will be losing both of its technicians soon. Lynn Womack, after five years of service, has elected to pursue a career in teaching and will depart the unit at the end of April; she will be missed. The current temporary technician, Chris Wood, will depart in June to begin a masters program at Appalachian State. With the aforementioned state budget crisis, permanent positions are frozen so replacing one or both of these folks may be a long time in coming. Gabriela Hogue continues to do a sterling job of developing and managing the data base as well as the collections. Our former technician, Morgan Raley, who did doctoral work on molecular systematics of minnows and darters with Rob Wood at St. Louis U., has moved down the street to the NCSU Vet school where we have established, as a joint venture, a fledgling molecular lab to pursue biodiversity questions in the regional fauna. He has begun sequencing work with a few fishes, mussels, and land snails as funding permits.

As for research and field work, Wayne Starnes finally returned the post-review emended version of a large manuscript on historical analysis and biotic integrity of fishes in the lower Potomac near D.C. to be published in the Proceedings of Biological Society of Washington's historic series on Plummers Island area biota (a hanging project from Smithsonian days). He is collaborating with Joe Nelson and Mel Warren on a paper discussing and espousing the capitalization (it's coming, see below!) of fish names (for *Fisheries* journal) and is trying to pursue some other projects on both freshwater and marine fishes. But curatorial responsibilities stemming from the backlog and databasing effort weigh in heavily these days when added to other time demands. Field work this year will focus on a funded survey aimed at identifying fish hosts for an endangered mussel (the Carolina heelsplitter) and characterizing fish communities where they occur. Other work will be aimed at further surveys for the undescribed "Carolina Redhorse" and, hopefully, searching for additional populations of the Bridled Shiner, *Notropis bifrenatus*, which was recently rediscovered in a NC Division of Water Quality collection from the lower Neuse basin (known previously in NC from a single record in 1961). Funding for survey work and genetic studies work on both of these species has been requested.

There will also probably be another multi-agency assault on the Pee Dee River this spring seeking additional Robust Redhorse specimens. A total of three are recorded since 2000 between Blewett Falls dam in NC and Cheraw, SC. Several

specimens of the rare "Carolina Redhorse" have turned up with Carolina Power & Light's fish monitoring efforts in Blewett Falls Reservoir, as well as one in the tailwater, yielding some optimism for persistence of this species in the Pee Dee. Otherwise, its only known stronghold is the lower Deep River, tributary to the Cape Fear in North Carolina. The existence of a reproducing population of Flathead Catfish was confirmed in that reach of the Deep this past year. The implications of this find with respect to the future of redhorses are a concern.

Some tidbits, several species, none surprising, have been recently documented for the first time from North Carolina waters (so far as known to us at NCSM). Collections from the upper Savannah basin in NC, connected with masters thesis surveys of Jason Robinson of North Carolina State University, yielded first vouchered occurrences in the state of the Blackbanded Darter, *Percina nigrofasciata*, a new Savannah basin record (in NC) for the Margined Madtom, *Noturus insignis*, as well as additional specimens of several species known previously only from very few specimens (e.g., *Etheostoma inscriptum*). Morgan Raley and Bob Jenkins may have the dubious distinctions of documenting the first western mosquito fish, *Gambusia affinis*, in NC as well as new basin and regional (in NC) record for *Pimephales notatus* from Hiwassee River tributaries.

Fritz Rohde

REGION II - Southeast

Conservation Notes:

Clearly the most significant news in the Southeast is the tentative, "unanimous agreement" to the Tri-State Water Compact, which delineates water allocation and interbasin transfer between the Apalachicola and Mobile river drainages, affecting Alabama, Florida, and Georgia. The sometimes-contentious compact, finally signed on 15 January, is (at this writing) open to the public for comment for 60 days, after which it must be signed by the governors of the three states. It will then undergo a final, thorough review by the Federal Commissioner before becoming a binding agreement.

Population growth and future water supply for Atlanta was a primal force driving the compact. Obviously, the states had specific concerns relative to water availability for commerce, industry, recreation, and natural resources. Florida's principal concern seemed centered on maintaining sufficient water in Apalachicola Bay to support the profitable oyster and shrimp fisheries, whereas Alabama's primary concern appears to be equability of water allocation with Georgia. The latter concern is valid: thirsty Atlanta plans to construct a "ring of reservoirs" to supply the megalopolis with water. In terms of wielding influence, Atlanta is very much a city-state, an irony given the predisposition of Georgians to naming their cities in honor of Greco-Roman civilization.

The U.S. Fish and Wildlife Service bears the onerous task of devising a plan to protect the high number of listed aquatic species in the taxa in these watersheds. It is hoped that these plans will indirectly protection to the large number of aquatic endemics). Protection of listed species is based on the caveat of creating opportunities for recovery, as mandated by the Endangered Species Act. In summary, manipulation of complicated plumbing is supposed to offset the negative effects of increased impoundment and system fragmentation, and increased degradation of lotic systems from the cascading effects of growth and landscape transfiguration. Obviously, the "C" in compact doesn't stand for conservation.

While the Fish and Wildlife Service is often criticized, maligned, and even sued by conservation groups, the small, understaffed federal agency tackled this complex problem with tenacity and conviction. Actually, the Fish and Wildlife Service was hamstrung by insufficient time and funding to conduct the background studies needed to understand the basic problems created by the compact. While "doing the best they could" is as unsatisfying as kissing your sister, the FWS represented the resource responsibly. Kudos.

The reality is that no biologist understands the array of habitat requirements of all the listed aquatic taxa in these basins. While variability of river discharges over time is intuitively recognized as an important model criterion, it is difficult to translate into engineering models. When rivers become regulated by dams, the question "How much water do species-communities-processes need?" seems to be a perfectly logical approach to managing a regulated systems for biodiversity. In the absence of information, the fall back position tends to argue for as much water as possible relative to the base flows of regulated rivers. Based on her work in the Tallapoosa River system, Mary Freeman observed that extraordinarily low flows during droughts might be important to the dispersal of little fishes. Perhaps such periods are important to maintaining intraspecific heterogeneity among tributary species. Yet, in developing compacts for water allocation, do "we" really want to say that 7Q10 flows are occasionally desirable?

It is difficult to think of successively impounded river reaches as the long-term state of those systems, yet planners appear to assume long-term maintenance of these dams is a given. Is it realistic, however, to assume that society will maintain these edifices 100, 200, and especially 500 years from now? Therein lies the rub between the biologist thinking about what is needed to maintain diversity and an engineer thinking about projected water demands. While the example is simple, its application is not. An engineering concept that throttles biological mindsets is that of "excess water," i.e., the flowing water that is not being put to "work." That is analogous to stating that the earth has excess atmosphere, i.e., any that is not used for respiration or to provide a thermal buffer is excess. In facing the intense pressure to "give up" water, the Fish and Wildlife Service had to adopt the position that protecting listed species will also protect most diversity, and the simplest and best way to accomplish this was to get as much water as possible.

A different, but potentially insidious threat is the rapidly expanding population of the red shiner (*Cyprinella lutrensis*) in the upper Coosa River. Fish surveys made during 1989 to 1993 only found the red shiner in the lower Etowah River. While spread of the aggressive red shiner was a point of concern, no evidence of its spread was detected until Summer 2000. At that time it was discovered to have spread throughout the Oostanaula

River and to have entered the lower reaches of the Conasauga and Coosawattee rivers, and to be causing a massive hybrid swarm with the "Mobile" blacktail shiner *C. stigmatura*. The red shiner is spreading in river mainstems at an estimated rate of 30.4 rkm/yr. At this rate, it will contact the lowermost populations of the threatened blue shiner *C. caerulea* in three years or less. This spring and summer, it will be determined if the red shiner will hybridize with the blue shiner in large current tanks.

Research Notes:

Mary Freeman spent the last two summers sampling fishes in streams on the lower Georgia Piedmont that are affected by water withdrawals or water-supply reservoirs, as part of a USGS-State Partnership Program with the GA DNR - Wildlife Resources Division. Our objectives are to relate fish community composition and integrity to potential for low-flow depletion. I'm still engrossed in data analysis, but we can say that all sites below water supply reservoirs scored fair to poor in terms of IBI, a finding of some concern given the proliferation of proposals for new reservoirs in response to the continuing drought. These sights can also be sources of nonindigenous species introductions.

Mary's compatriot, Bud, is a CO-PI with Laurie Fowler (UGA Institute of Ecology and Law School) on an effort to develop habitat community profiles for imperiled fishes in the Etowah basin. They have received the first funding of a 3-year project, motivated by the astronomic urban growth occurring in the basin, near areas of persisting species diversity. This type of study is likely needed in aquatic basins throughout the southeast, in streams representing the array of landform (geologic and physiographic) diversity.

Steve Walsh, USGS, Florida Caribbean Science Center, Gainesville, has been contracted by the Florida Park system to survey the magnitude 1 springs in the state for fishes. It is not often that one gets to sample these startlingly beautiful springs; consequently, his trips are popular and well supported by laboratory personnel. In contrast, Leo Nico's fieldwork in South Florida canals, for nonindigenous fishes, remains the least popular trips among lab personnel.

Welcome: Walt Courtenay, retired Professor Emeritus et seq., has taken a position as a Biological Technician at the USGS lab, Gainesville (yet another ichthyologist). Walt has become a regular fixture at the lab. Yet, he can be easily recognized as an "emeritus scientist" by virtue of color coordination and the cell phone belt holster. Needles to say, Carter Gilbert is jealous of both. Walt, Pam Fuller, Leo Nico, and Jim Williams are the organizers for the nonindigenous species symposium at the forthcoming ASIH meetings in Kansas. Other Gainesvillians: Howard Jelks, with ex-gator cum Jesuit (Loyola University of New Orleans) Frank Jordan, are continuing work on Okaloosa darters, entering their seventh year of monitoring darter populations. Research by N. Burkhead is focusing on the "axis of evil" red shiner and its misbehavior with congeners in the upper Coosa River system.

Apology: Due to the late preparation, and somewhat sparse response by Region II contacts, the regional report is atypically short and concise.

Noel Burkhead

REGION III - North-Central

Status surveys and other interesting finds

Bill McLarney reported an interesting find as a result of surveys in the Little Tennessee River system upstream of Fontana Reservoir. He noted that surveys conducted during September-November of 2000 and 2001 have shown a hitherto unsuspected migration of the threatened spotfin chub, *Erimonax* (=*Cyprinella*) *monachus* up tributaries of the Little Tennessee River in Swain and Macon Counties, North Carolina. The conventional wisdom has been that this species is almost exclusively a mainstem inhabitant. A very few individuals, mostly juveniles, have been found in three tributary streams during the spring and summer: Over a period of 12 years (1990-2001), 32 summer IBI samples in the lower reaches of 18 tributaries to the reach of the Little Tennessee known to harbor this species have turned it up on just one occasion. However it has recently been shown that in the fall, spotfin chubs may penetrate tributary streams to a distance of three miles or more upstream of their mouths. Occasionally they are found in surprising numbers; a single seine haul in a pool in Brush Creek in October 2000 turned up an estimated 300 individuals. More usually they are found in modest numbers. So far, all six Little Tennessee tributaries downstream of Porters Bend Dam at Franklin, NC (the upper limit of spotfin chub range in the river) with watershed areas of more than four square miles have been sampled in the fall; all contained spotfin chubs. In addition, six of eight tributaries with watershed areas of two to four square miles have been searched, with small numbers of spotfin chubs reported from three streams.

In every case, including those streams where spotfin chubs were not found and one still smaller tributary, large numbers of the whitetail shiner (*Cyprinella galactura*) were taken. While it is not unusual to take individual whitetail shiners in small tributaries during the summer, it is also considered to be a "river fish", and is never taken in large numbers from small tributaries. In one instance, numbers of both species were such (at a distance of over two miles above the river), that both species could be taken from shallow runs with every pass of a dip net. These findings illustrate a significant and unstudied biotic interchange between mainstem and tributaries.

Three each of the larger and smaller tributaries join the Tennessee on the 4,600 acre Needmore Tract, owned by Crescent Resources. Both the Macon and Swain County Commissions, along with many conservation organizations, have supported the acquisition of the Needmore Tract as a conservation priority. The focus has been on the Little Tennessee River, but these findings suggest the importance of fully protecting tributary watersheds on the Needmore Tract as well as the river corridor.

The lake sturgeon restoration project is continuing in the French Broad River downstream of Douglas Dam. Cooperators include the Southeast Aquatic Research Center (SARI), TVA, Tennessee Wildlife Resources Agency (TWRA), U.S. Fish & Wildlife Service (FWS), and the Tennessee Cooperative Fisheries Research Unit. Rick Bivens (TWRA) and Ed Scott (TVA) reported four lake sturgeon recovered by boat electrofishing & net surveys in tail-water surveys summer 2001.

Charlie Saylor reported that TVA completed IBI fish

surveys at 194 sites during 2001, but he had no range-extensions or other items of interest to report. TVA will continue to do IBI surveys at 180-200 sites in 2002. Charlie did comment that, in comparison with the results of IBI surveys five years ago, the results of the 2001 surveys there were more sites that had improved than got worse. Their theory is the improvements are likely due to the low rainfall (and therefore, less non-point-source runoff) we've had in the Valley the past few years.

Chris Skelton (GA Natural Heritage Program) reported that he and Rex Strange (SE Missouri State Univ.) have received monies from Region 5 FWS to survey for blackside dace (*Phoxinus cumberlandensis*) in the Powell River system in VA, where Chris had recently discovered a population in Cox Creek. In addition to surveying for additional populations, they will also be comparing genetic make-up of the known Powell population with upper Cumberland populations in an attempt to determine if those occurring in the Powell are the result of bait bucket introduction, or natural exchange. They will begin surveys in spring 2002.

Rick Bivens (TWRA) reported several state records. They collected five specimens of what he thinks may be mountain redbelly dace (*Phoxinus oreas*) from Laurel Creek in Johnson Co, TN in September 2001. Laurel Creek is a tributary of the South Fork Holston River near Damascus VA. Their survey site was located approximately 0.8 miles upstream of the TN/VA state line. These fish were not present at the same location in 1993 (when they used the 3-pass depletion survey, same as in 2001). Rick sent photos to Bob Jenkins and Wayne Starnes, and both agreed that they were *P. oreas*. So, although the species is known from the watershed in VA (see Jenkins' and Burkhead's book) this tentatively, represents a new record for TN. Another state record was the first recorded white catfish (*Ameiurus catus*) from Tennessee collected in the Pigeon River at Hartford, Cocke County, 21 June 2000. It is catalogued as UT 48.1014.

Rick also reported collecting three blue suckers (*Cycleptus elongatus*) from two localities on the Nolichucky River (river miles 30.9 and 39.1) in the summer of 2001. One fish measured 698 mm TL and all were released.

Jim Herrig (U.S. Forest Service) reported using a habitat model to predict the occurrence of Tennessee dace (*Phoxinus tennesseensis*) in eight previously unsurveyed National Forest streams. Their crews found populations of Tennessee dace in four of the eight streams, and an additional population in a stream that had not met the model criteria. This single season of directed effort increased the known populations on the Cherokee National Forest from 20 to 25. He suspects there may be several others in the vicinity, but off National Forest lands. In 1990 he used the same criteria on the Daniel Boone NF to search for streams with blackside dace (*Phoxinus cumberlandensis*). Then, they found four (three in a single day!) previously unknown populations in 12 streams predicted by the model. The model seems to work pretty well for *Phoxinus*. He is working on refining it for as many of the 120 species of fish documented on the Forest. All of the parameters used in the model are derived from maps. He says field measurements would surely increase the predictability of the model, but if you're in the field anyway, why not just survey for the fish?

Jeff Powell (USGS) reported that the U.S. Geological Survey sampled 25 streams across the lower Tennessee Valley in 2001, and 32 streams in 2000, as part of the Lower Tennessee River NAWQA project. Streams were of similar size (30-60 square miles) and were concentrated primarily in the Eastern (EHR) and Western Highland Rim (WHR) ecoregions (level 4). Fish, invertebrate, and algae collections were made, along with extensive instream, land use, and water chemistry assessments. Results from these efforts are being used to evaluate biotic community response to land use (primarily agriculture) at the ecoregion scale, thus providing policy makers with a predictive tool that is scientifically based.

Listed below are a few of the highlights of these two years worth of surveys. Streams in the WHR, which are less impacted by agriculture, averaged more than 30 species per site, while streams in the EHR averaged 21 species. Chisholm Creek (tributary to Shoal Creek in Wayne Co., TN) had the highest diversity (43 species), including 12 darter species.

The federally threatened slackwater darter (*Etheostoma boschungi*) was collected in Limestone Creek (Madison Co., AL) in 2000 (possibly new record). Blotchside logperch (*Percina burtoni*) were frequently collected throughout the WHR (seven sites). Flame chubs (*Hemitrema flammea*) and blotched chubs (*Erimystax insignis*) were also frequently collected, along with a single spring cavefish (*Chologaster agassizi*) collected in Beans Creek (Franklin Co., TN).

A number of crayfish collections were also made in support of Jen Buhay's (University of Alabama) dissertation work on crayfish genetics in the Tennessee and Cumberland Rivers.

As reported last year, improvements in the water quality of the Pigeon River (French Broad watershed, Sevier Co., TN), prompted Tennessee Department of Environment & Conservation (TDEC) biologists (and many other cooperators) to begin a long-term project to restore native fishes to the Pigeon River. To start the project, the group came up with a list of relatively common fishes that could be collected in large numbers elsewhere in the French Broad system.

Jonathan Burr (TDEC) and John Taylor and Joyce Coombs (UT) reported that, this project has resulted in the release of 347 gilt darters (*Percina evides*), 243 bluebreast darters (*Etheostoma camurum*), and 139 blueside darters (*E. jessiae*), to date. All fish have been tagged by injection of small amounts of fluorescent elastomer dye in the dorsal area. Once tagged the fish are transported to the Pigeon, acclimated, and released. UT graduate students will attempt to track the survival and movement of the released fish over the course of the next two years. Electroshocking and snorkeling surveys in late summer of 2001 documented survival and apparent health of gilt darters tagged and released in May and June of that year. In 2002, they hope to add to the numbers of stocked and tagged fishes of the species listed above, so that overall totals are in the 500-1000 range, depending on species. Then, they will begin looking for successful reproduction in the reintroduced populations. Also, they hope to begin moving at least two additional species this year: mountain madtom (*Noturus eleutherus*) and stargazing minnow (*Phenacobius uranops*). Longer-term goals include possibly propagating some of the more rare species that can't be collected in large enough numbers for reintroduction.

Once again, Pat Rakes and J.R. Shute (Conservation Fisheries, Inc, CFI) surveyed many places, and spent many hours of unsuccessful observations (both nets and snorkeling) looking

for slender chubs (*Erimystax cahni*) in the Clinch and Powell rivers. However, they did document new localities for yellowfin madtoms (*Noturus flavipinnis*) in the Powell River: several miles downstream of Buchanan Ford at first bridge crossing; several miles above Buchanan Ford at the mouth of Mulberry Creek. Also, Jess Jones (Virginia Division of Game & Inland Fish) and Steve Fraley (TVA) also reported yellowfin madtoms for the first time in Virginia's portion of the Powell River as they saw three individuals during snorkel surveys for mussels at Fletcher Ford. Pat and J.R. noted excellent yellowfin madtom habitat at Fletcher Ford, and plan to return there in summer 2002.

Pat Rakes reported that CFI's 2001 observations indicate that all three of the federally listed fishes appear to be doing very well in Citico Creek. Record numbers of smoky and yellowfin madtoms (*N. baileyi* and *N. flavipinnis*) were observed this year. The entire range of the yellowfin madtom in Citico Creek (a little over three stream miles) was surveyed on two nights only a few days after 9/11/01. The observation of 93 individuals (including 10 young-of-year) on those two dates was one of the best things we could have done at that time! Water conditions were perfect, low, warm, and clear. Eleven adults were collected for morphometric and meristic data for taxonomic work by Nick Lang (a student of Rick Mayden's at the University of St. Louis). Lang has also been provided with tissue samples from Copper Creek and Powell River yellowfin madtom populations.

Other CFI observations as a result of the Clinch and Powell surveys include the observation of blotchside logperch (*Percina burtoni*) in the Clinch River at Horton Ford (Hancock Co., TN). This locality is several miles downstream of the TN/VA state line. Although the record isn't too surprising, it represents a new locality for the species. They also saw several *P. burtoni* while snorkeling in the Clinch River about one stream mile downstream of Speers Ferry. Etnier also reported a snorkel observation from Bob Butler (FWS) of *P. burtoni* in the Big South Fork.

Another interesting find resulted in the collection of egg clusters of unknown species while snorkeling Frost Ford on the Clinch River, on May 3, 2001. The eggs—100-200—were large (~2.5-3 mm diameter), and stuck together in a cluster. They brought the cluster to CFI to rear. On 6 June a similar cluster was found in Citico Creek. This one was located beneath a palm-sized rock, in an open crevice on downstream side of the rock. These were also brought to CFI for rearing. They both turned out to be sawfin shiners. Apparently, they, like Cahaba shiners, are egg clusters (no parental care).

Pat Rakes (CFI) reported that he surveyed appropriate habitats for Barrens topminnows (*Fundulus julisia*) throughout Duck River portion of the species' range with no success. Tyler Sykes reported conservation efforts for this species (see below).

Tyler Sykes, of the Cookeville office of FWS, reported that a new survey for the federally threatened blackside dace (*Phoxinus cumberlandensis*) will begin in summer 2002. Dr. Hayden Mattingly, a new professor at Tennessee Technological University, and his graduate student(s) will be assessing the present distribution and status of the species, seasonal movements, and potential impacts of land uses on populations within this range. Findings should help the Service direct recovery efforts, and better assess the potential impacts of proposed projects within the range of the species.

Rakes also reported a CFI survey of the Buffalo River for spotfin chubs. They floated the river from the first stream crossing upstream of Nachez Parkway (BRM 105) downstream to about BRM 100. Spotfin chubs (*Erimonax monachus*) were again found in the Buffalo River at the mouth of Grinders Creek, where spotfin chubs have been reported previously by many collectors. They were also found at a site several miles upstream of this locality, at the Nachez Trace parkway bridge, and then at about BRM 102. This is an upstream range extension for the species in the Buffalo River. These will be used for propagating individuals to eventually stock into Shoal Creek. Rakes noted that much bedrock was observed at this site, and that it looks similar to areas CFI surveyed in Shoal Creek where the fish is proposed for reintroduction.

Tyler also reported that the FWS is continuing work conducted by Jeff Simmons, a graduate student from the Tennessee Cooperative Fisheries Research Unit, to look at the structure and stability of all known occurrences of the bluemask darter [*Etheostoma* (*Doration*) sp.]. To date, he has collected and measured over 1,000 individuals, and indicates that habitat in the Collins River is good and bluemask darter populations appear to be thriving. In 2002, he will concentrate his efforts in the Calfkiller and Rocky rivers, and Cane Creek. He will determine status, movements, and habitat preferences there.

Etnier reported that Mike Doosey finished his Master's project on the fishes of the Little Pigeon River. Deuce is back in NJ working several days a week at AMNH (for free, but he has to pay for his travel).

Etnier also reported that the UT fish collection and Etnier's office has moved to White Ave Annex, at the junction of White Ave (1 block n of Cumberland) and James Agee St., across from the U.T. Law School. Ets will bring corrections/additions copies (free) that were incorporated in the 2nd printing, Fishes of TN, 10pp. for those of you who have the first printing.

Captive propagation, reintroduction, and other management activities

Pat Rakes and J.R. Shute (CFI) reported results of the Abrams Creek project in the Great Smoky Mountains National Park, (Blount County, TN). As reported previously, duskytail darters (*Etheostoma percnurum*) are spawning in Abrams Creek, although 2001 survey efforts were planned to ensure little interference with nesting fishes. However, one survey in the spawning season (May 4) resulted in the find of a nest. Ten young-of-year duskytail darters are also indicative of ongoing reproductive success for this reintroduced population. These young were seen in two or three areas that haven't been stocked since 1993. Either they were established from them, or are dispersing from upstream. Good news either way. This year's observation resulted in 47 duskytail darters in 27 hrs. effort, for a new high fish/observation index of 1.74.

Only three smoky madtoms (*Noturus baileyi*) were observed in Abrams Creek in summer 2001, but smoky madtom observations were less likely during the 2001 field season because most individuals are seen during spawning season surveys. Eight yellowfin madtoms (*N. flavipinnis*) were observed during 2001 field surveys in Abrams Creek. Two of these were wild-spawned, young-of-year individuals; one fish observed was a one-plus year-old with no tag. All 2000 year-class fish stocked in spring 2001 were tagged. Four of these

yellowfin madtoms were found in sites that have never been stocked, indicating the species is dispersing, at least one or two pools downstream of stocked sites within the creek. The yellowfin madtom fish/observation effort index for 2001 surveys in Abrams Creek, 0.3, is good. Several hundred tagged spotfin chubs (*Erimonax monachus*) were stocked in Abrams Creek in July 2001, but no observations of this species were made in 2001 surveys. CFI plans to place more emphasis on Abrams Creek monitoring in the 2002 field season. The National Park Service is hoping to get a graduate student to help do this work.

Rakes and Shute also reported that they collected yellowfin madtom nests from Copper Creek. Individuals reared from these nests will be used for managing that population and to maintain captive pop. During the 2001 surveys to collect these nests, they observed 16 yellowfin madtoms at one site in Copper Creek. They also reported collecting slackwater darters (*Etheostoma boschungi*) for propagation research. They found the darters easily in the North Fork Buffalo River at Gum Springs Branch, Lawrence Co., TN, and collected eight (October 2001). On the same day, they also collected 12 individuals in Little Shoal Creek at a racetrack (Dooley Rd.), where there was almost no water. Since January 2002, the males have been highly colored in CFI aquaria.

Tyler Sykes (FWS) reported that conservation efforts are proceeding nicely for the extremely rare Barrens topminnow (*Fundulus julisia*). In summer 2001, topminnows (captively propagated by CFI) were released into six restored spring sites within the historic range of the species. These fish were all marked with Elastomer tags for a long-term study that was initiated in summer 2001. A graduate student at Tennessee Technological University will use these tags to help monitor the success of the releases. These efforts are garnering attention from local and state media outlets. Newspaper articles were generated from the releases and Tennessee Wildlife Resources Agency's television show "Tennessee Wild Side" will be airing a segment on the topminnow in spring 2002. The Barrens topminnow Working Group continues to meet on an annual basis to discuss progress to date and future plans.

Tyler also reported the publication of a proposal to designate nonessential experimental population (NEP) status under section 10(j) of the Endangered Species Act of 1973, as amended, and to reintroduce two endangered fishes—the duskytail darter (*Etheostoma percnurum*) and smoky madtom (*Noturus baileyi*)—and two threatened fishes—the yellowfin madtom (*Noturus flavipinnis*) and spotfin chub (*Erimonax monachus*)—into the Tellico River between the backwaters of the Tellico Reservoir (approximately Tellico River mile (TRM) 19 and TRM 33, near the Tellico Ranger Station, in Monroe County, TN. It is anticipated that this rule will be finalized some time in 2002. As a result, personnel with CFI will step up propagation efforts for all four fish to provide adequate numbers for reintroductions to the Tellico River. They will also subsequently monitor these reintroduction efforts for success.

Peggy W. Shute and David A. Etnier

REGION IV - South-Central

Frank Parauka of the U.S. Fish and Wildlife Service in Panama City, Florida reports that personnel from his office and John Allen of the National Fish Hatchery, Mississippi, spent 34 boat days of effort in 2001 attempting to capture *Scaphirhynchus suttkusi* in the Alabama River. Over 1600 fishes representing 24 species were collected using sinking gill nets and baited trot lines, with *Carpiodes velifer*, *C. cyprinus*, and *Aplodinotus grunniens* accounting for 65% of the catch. No Alabama sturgeon were collected, but two *Acipenser oxyrinchus desotoi* were collected in May with gill nets 4.8 m deep. One fish escaped during retrieval, but the other was radio tagged and monitored moving upstream for two days. Attempts to relocate this fish in late May, June, and August were unsuccessful. Other work with Gulf sturgeon included a survey in the lower Choctawhatchee River in October and November to coincide with the fall migration to the marine environment. Sinking gill nets were set perpendicular to the bank, covering about 75% of the river. A total of 188 sturgeon were collected, PIT and Floy tagged, and released, with fish ranging from 52-229 cm TL and 0.45-72.9 kg. Sub-adults (< 18 km) represented 44% of the catch while large fish (> 45 kg) accounted for 8%, these data are similar to previous years surveys. A similar survey in Brothers River, a tributary of the Apalachicola River, captured 61 specimens ranging from 98-224 cm and 1.5-67.5 km. During these two surveys and a survey in the Yellow River, eight adult Gulf sturgeon were equipped with pop-up archival tags programmed to record depth, temperature, and light and downloadable to a satellite on a given date. These fish and nine others were also fitted with sonic tags. Two of the pop-up tags gave real time location of the fishes, one in Choctawhatchee Bay (tagged in Choctawhatchee River) and the other in the Gulf of Mexico east of Panama City (tagged in Yellow River). Sonic tag detection confirmed these localities, and located three other sonic tagged sturgeon in the Gulf of Mexico, ranging from 1.6-4 km off shore at a depth of 2.7-5 m. The two tags failed to release data on the pop-up date. Frank also reports that a survey for potential spawning habitat for Gulf sturgeon in the panhandle region identified 152 sites, with most of these in Alabama along the Conecuh, Pea, and Choctawhatchee rivers.

Carol Johnston at Auburn University reports that she is continuing her studies with sound production in fishes. This includes geographic variation of sound in *Cyprinella* and sound production in *Scaphirhynchus* with Cathy Nordfelt, and examining possible sound production in cavefish with Jon Armbruster and Carrie Allison. Other studies include a status survey of *Pteronotropis euryzonus* and the reproductive biology of *Centrarchus macropterus* with Michelle Castro and population viability of *Etheostoma boschungi* and *E. brevirostrum* with Wendi Hartup. Carol and Bryan Phillips are examining the recovery gradients of streams from small impoundments by using historical data from Bear Creek that Wall presented in his 1968 thesis. Other studies include surveys of Alabama streams and predicting diversity and density by physiographic region, the recovery of a swamp system after severe drought, and the status of *E. phytophilum*.

Bob Stiles at Samford University reports that he and Paul Blanchard have just finished a status survey of *Etheostoma*

phytophilum in the Turkey Creek watershed of Locust Fork of the Black Warrior River. They found a small population in a spring fed creek located just upstream of Penny Spring; but none within Penny Spring proper, a historic site. The dominant darter in both locations was *E. nuchale*, which is non-native and was transplanted into the spring some years ago. In May 2001 no specimens were collected at the type locality (along Alabama Hwy 79), but resampling in October revealed a robust population. Bob and Paul also surveyed the historic site at Cove Spring in upper Locust Fork where one specimen was taken in 1975. Though the spring and the associated extensive wetland appear to be ideal habitat, none were found. Other news from Samford includes the first record of *Percina sciera* in the Cahaba River, collected by Mike Howell and his vertebrate zoology class at County Road 24 in Shelby County. This site includes a spring-fed swamp, and *Elassoma zonatum*, not seen here for a decade, was also collected.

Scott Mettee reports that the Geological Survey of Alabama in Tuscaloosa (Pat O'Neil, Tom Shepard, and Stuart McGregor) continues with the sonic tracking of several species of riverine fishes in the Alabama River. A survey of Locust Fork documented the distributions of *Notropis cahabae*, *Percina brevicauda*, and *Etheostoma douglasi* within the drainage. Sampling at 39 stations produced Cahaba shiners in 61 river miles of the main channel from the first shoal upstream of the embayment of Bankhead Lake upstream to Nectar in Blount County. Cahaba shiners were also taken in the lowermost 5 miles of Blackburn Fork. Coal darters were taken in the same 61-mile range of the main channel of Locust Fork, but in only the lower 4 miles of Blackburn Fork. *Etheostoma douglasi* was taken over 70 river miles from the first shoal upstream of the Bankhead Lake embayment upstream to Swann Covered Bridge in the main channel of Locust Fork, as well as in Turkey Creek, Gurley Creek, and Blackburn Fork. A survey for these three species in the Mulberry Fork system as well as evaluating biological conditions using the IBI is ongoing. Thus far, 51 collections have produced no records of *N. cahabae* or *P. brevicauda* in Mulberry Fork, and *E. douglasi* was found only in upper Sipsey Fork, Brushy Creek, and Blackwater Creek. The Geological Survey completed a forth year of sampling of tributaries of the upper Tombigbee River and the first of several years of sampling in the main channel of the Tombigbee for listed and candidate species of freshwater mussels. A GSA report of results of sampling in the Tombigbee tributaries is in preparation with assistance from U.S. Forest Service Hydrology Lab in Oxford, Mississippi. Mussel research published, in press, or presented at meetings includes the current status of mussels in the vicinity of Muscle Shoals on the Tennessee River, changes in the mussel fauna of Bear Creek in northwestern Alabama and northeastern Mississippi, and mussel fauna of the Sipsey River and the Cahaba River. Lastly, GSA is continuing to monitor populations of Alabama cave shrimp, *E. tuscumbia*, and associated water quality parameters at Redstone Arsenal, Madison County.

Mark Peterson at the Gulf Coast Research Lab in Ocean Springs, Mississippi, is working on the spatial and temporal distribution, species associations, and trophic interactions of invasive tilapiine fishes with recreational freshwater fishes in south Mississippi along with Todd Slack of the Mississippi Museum of Natural Science in Jackson. Mark has begun several estuarine projects, including identifying essential fish habitat in the Grand Bay National Research Reserve (with C. Rakocinski), using otolith microchemistry to determine important geographic sources of juvenile nursery habitat (B. Comyns, C. Rakocinski, and A, Shiller), and examining the improvement of sustainability and nekton utilization in coastal salt marshes by gapping material levees (D. Reed). Additionally, Mark, along with Steve Ross at the University of Southern Mississippi in Hattiesburg, will begin mapping coastal habitat parameters in the Pascagoula River estuary as a tool to protect and preserve coastal habitat diversity and sustainability. Other mapping projects include coast-wide mapping of the highly invasive common reed, *Phragmites australis*, and mapping and quantifying shoreline habitat types in association with coastal and estuarine waterfront development (with B. Comyns). Recent publications by Mark include field growth responses of juvenile *Cynoscion arenarius* to continuous variation in physical habitat conditions, reproductive biology and differences among estuaries of female *C. nebulosus* in the northern Gulf of Mexico, the status and habitat characteristics of *Fundulus jenkinsi* in eastern Mississippi and western Alabama coastal bayous, and. the use of Bryozoa as an ephemeral estuarine habitat and a larval transport mechanism for mobile benthos and young fishes in the north-central Gulf of Mexico.

David Etnier at the University of Tennessee in Knoxville reports that graduate student Ben Keck is redoing the fishes of the Hatchie River system. Ben has added *Ameiurus nebulosus* and *Ctenopharyngodon idella* to the Hatchie fauna so far. Dave and his regional faunas class collected the Mississippi River in the Dyersburg, Tennessee to Carruthersville, Missouri area in October. Significant finds included a juvenile *Notropis boops* from a seine sample, *Macrhybopsis meeki* from a small trawl, and *Scaphirhynchus albus* (or a hybrid) from a gill net. Dave promised the 20+ participants a fish fry, but by week's end only three small channel catfish had been collected. Not to be deterred, a 35-lb *Hypophthalmichthys nobilis* and a 25-lb *C. idella* were chunked into appropriate sizes, corn-mealed, and cooked in deep fat fryer, both ranked as better than the channel catfish cooked the same way. Ets recommends completely removing the red streak; bones were so big that they were no problem.

Pat Rakes reports that Conservation Fisheries, Inc. (CFI) of Knoxville, Tennessee, continues its successful propagation of *Notropis cahabae* and *Percina aurolineata* from the Mobile Basin. These listed species are needed by the EPA to conduct toxicity studies as part of an effort to evaluate the protectiveness of water quality criteria for the Cahaba River ecosystem in Alabama. Techniques were developed and refined to deal with egg recovery and incubation and the extremely small size of both species' larvae. Larvae of Cahaba shiners (1,300) were successfully shipped to EPA last year, but no larvae of goldline darters survived any mode of shipping attempted. The pelagic behaviors and microhabitat requirements of the darter larvae were likely responsible for this mortality. Potential refinements will be tested next year with the goldline darter to address these shortcomings. Pat also reports that CFI observed the normal numbers of rare species (*Cyprinella caerulea*, *Etheostoma brevirostrum*, *Percina jenkinsi*, and *P.* sp. cf. *macrocephala*) in a Conasauga River survey for the Cherokee National Forest.

At the University of Alabama Steve Powers appears to have an undescribed species of *E. pyrrhogaster* endemic to the Forked Deer River in western Tennessee. Steve also has preliminary data indicating genetic partitioning among disjunct populations within *E. cinereum*. David Neely continues his work on North American sculpins, with an emphasis on Mobile Basin forms. Phil Harris has submitted papers on molecular relationships of the Moxostomatini with Rick Mayden at Saint Louis University, and molecular relationships within Centrarchidae, within *Lepomis*, and within *Ambloplites* with Rick and Kevin Roe (SLU). David, Phil, and Rick are also looking at the genetic variation within the *Noturus munitus* complex. Other projects at Alabama include a status survey of *Etheostoma* sp. cf. *zonistium* within Bear Creek and intra-specific variation within species of Scaphirhynchinae.

Bernie Kuhajda

REGION VI - Southwest

Fish biologists in the southwestern region were responsible for a surge in habitat studies, and for the development of several databases during the past year. Several ventured beyond the confining taxonomic borders of traditional ichthyology to study aquatic organisms other than fish.

Henry Robison reports that he and Rudy Miller are working on a second edition of the "Fishes of Oklahoma" for University of Oklahoma Press. It will be in the same field guide style as the first edition in 1973, but completely updated. Rob is also working on a "Crayfish Database for Arkansas" for the Arkansas Game and Fish Commission and adding records to the Arkansas Fishes Database continually.

Steve Filepek, Darrell Bowman, Dave Evans, Stephen O'Neal, and Phil Penny, members of the Arkansas Game and Fish Commission Stream Team, are evaluating angled rock vanes as a method for rehabilitating streams. Adapting technology from the US Army Corps of Engineers, hydrologists are working with fisheries biologists now to show how the use of upstream angled rock vanes, along with topical use of boulders, can be a significant tool in slowing bank erosion while providing instream fish habitat. Much less rock (a.k.a. rip rap) is used than in traditional stabilization efforts, streambanks are stabilized, currents can be redirected when necessary, while streambank cover and diversity are maintained and velocity refugia and feeding stations are established. Several of these upstream angled rock vanes have been used in Arkansas on various sized rivers with good results.

Biology students Mark Antwine and Jimmy Alley, along with faculty Frank Pezold, Peter Aku and Anna Hill, from the University of Louisiana at Monroe (ULM) are conducting field surveys of fish and freshwater mussel diversity for the Arkansas and Louisiana field offices of the Nature Conservancy in Bayou DeLoutre and Bayou Bartholomew. Surveys are under the auspices of the ULM Museum of Natural History. Mark and students Jamie Hardage, Valerie Alley, Brian Lynch, Amy Matthews, John White, Joe Schlossman are also working with David Byrd of the Kisatchie National Forest on a project studying fish-habitat associations in forest streams. In addition, Frank, Mark, and other biology students will be assisting the La Natural Heritage Program with a status survey of sensitive fish populations in north Louisiana. A review of the spinycheek sleepers (Eleotridae: *Eleotris*) of the Western Hemisphere has been completed with Bryan Cage of the University of Mississippi and is in press (Tulane Studies in Zoology and Botany). ULM undergraduate, Chris Davis, has been collecting morphological data on Western Hemisphere and West African species of fat sleepers (Eleotridae: *Dormitator*). Both genera have species native to oligohaline estuaries of the southeastern United States and may be obtained in freshwater. Peter Aku and student Li Yong are using stable isotopes to study the aquatic food web in an urban wildlife refuge, Black Bayou Lake, on the edge of Monroe.

ULM's extensive fish, reptile, and amphibian records (and specimens) have long been freely available to researchers, but soon those records will be even more readily accessible. All 77,000+ fish records of the ULM Museum of Natural History's Zoology Division are now in a computer database and the approximately 55,000 reptile and amphibian records are in the process of being entered. Substantial progress has been made with snakes, frogs and toads. Frank Pezold reports that he and his colleagues are developing a program that will allow online access to the fish records that will hopefully be in place by the end of this year. For access to the museum and more information, please visit the web site: http://www.ulm.edu/~pezold/welcome.htm.

One last item of note from ULM: Professor Emeritus Neil Douglas has updated his classic book "Freshwater Fishes of Louisiana." The update, written with Robyn Jordan as an article for this volume of the SFC Proceedings, is titled "Louisiana's inland fishes: a quarter century of change." In 1974, Neil documented 148 species in 22 families. According to his most recent account, 168 species in 25 families are now known from the waters of Louisiana. Neil has also been very active in the numerous field projects and in curating the many specimens collected with biologists from the Waterways Experiment Station (WES).

Six members of the WES Fish Team conducted active research in the region: full-time personnel Jack Killgore, Jan Hoover, Steven George, Bradley Lewis, and Catherine Murphy, along with part-time adjuncts Neil Douglas and William Lancaster. Sponsored by the U.S. Army Engineer District in Vicksburg, the WES Fish Team completed field studies of proposed habitat restoration projects in three streams that are degraded: Bayou Desiard, Louisiana, with noxious aquatic plants; Bayou Macon, Louisiana, by seasonal de-watering; and the Ouachita River, Arkansas (below Remmel Dam) by daily pulses of cold water. Weirs of different designs are being considered for these streams that will allow periodic drawdowns for plant control, provide pooling during low water, and create slower, shallow water to facilitate warming. With funding from the Corps of Engineers Ecosystem Management and Restoration Research Program, the WES Fish Team also continued studies of small floodplain pools of Bayou Meto, Arkansas Fish and amphibian assemblages there will be compared with pool communities in central Mississippi. Bowfin collected last year

from a Bayou Meto floodplain pool were used in swimming endurance tests; they are currently retired from their careers as professional swimmers but their role in primitive fish research continues as growth rates are monitored in laboratory aquaria.

The WES Fish Team, with sponsorship from the U.S. Army Engineer Mississippi Valley Division, is also continuing studies of shovelnose and pallid sturgeons in the lower Mississippi River. More than 1200 sturgeon have been sampled from Memphis to Donaldsonville, Louisiana. Data are collected on macro- and micro-habitats, fish size structure, morphomeristic characters, and most recently on food habits. A technique for safe and gentle gut sampling (i.e., colonic flushing) was developed and has proven very successful for obtaining fecal samples from which prey are identified and enumerated. Preliminary results indicate that in winter pallid sturgeon and shovelnose sturgeon both feed on caddisworms, burrowing mayflies, and larval midges, but that pallid sturgeon also consume large quantities of cyprinids.

Smaller streams of east Mississippi are also under study by the WES fish team. In cooperation with the Mississippi Department of Environmental Quality, delta streams that were sampled for flood control studies in 1989-1994 are being re-sampled so that fish-based indices of environmental quality can be developed. Also, upland streams of the Yazoo Drainage are being sampled in conjunction with geo-morphological studies in an effort to relate the sediment transport dynamics and stream channel evolution to fish communities.

Jan Hoover

BOOK REVIEW

DANGEROUS WILDLIFE IN THE SOUTHEAST: A GUIDE TO SAFE ENCOUNTERS AT HOME AND IN THE WILD. Lynn F. Bachleda. 2001. Menasha Ridge Press, Birmingham, Alabama. ISBN 0-8973-2335-1. 231 p., $22.95 (soft-cover).—F. Lynn Bachleda's *Dangerous Wildlife in the Southeast: A Guide to Safe Encounters at Home and in the Wild* deserves a better title. A suitable replacement would be: *You Have Very, Very Little to Fear in Nature*. This sentiment, in the author's own words from the Introduction, is a more accurate reflection of the overall philosophy of this guidebook on dealing with potentially dangerous wildlife. Bachleda wisely combines very recent evidence, scientific data, and personal accounts to instill the idea that Nature is not as scary as most people think. The main strength of this guidebook is its presentation of timely facts that clarify or completely debunk the many assumptions about the dangers of venturing into the wild. While there are some problems with consistency and a few sections where the scientific matter could be stronger, the information in the guidebook still provides valuable peace-of-mind to those who regularly work or play outdoors.

Although very few of the animals described are aquatic, southeastern ichthyologists and fish biologists will still find many useful and relevant sections in the guidebook. Browsing through the chapters, the fish-oriented reader cannot help but reflect upon his or her own disastrous fieldwork mishaps and exciting "encounters with nature." For example, it is not uncommon to find alligator snapping turtles (page 49) and cottonmouths (page 29) in hoopnets set for fishes. Proper removal of these by-catch animals is important to all parties involved. Seemingly innocuous activities, such as changing batteries in a remote data-logger, can become painfully memorable, especially if a misplaced ladder is combined with an underground yellow jacket nest (page 85). Then there are those field incidents that generate thought-provoking questions: "I wonder if this pronounced cephalic swelling I'm experiencing is caused by a reaction to multiple mosquito bites (page 105) or my copious use of bug spray (page 114)?" Events like these will always plague field biologists, but Bachleda's guidebook offers calming and logical advice for handling such situations.

The guidebook is organized in typical field guide format with each chapter beginning with general information on the taxa covered and ending with specific accounts of organisms. Because of the wide-breadth of life forms discussed (from viruses to plants to sharks), the reader may notice inconsistencies in coverage among chapters. The overall impression is that Bachleda has acted as an editor for various expert sources, "cutting and pasting" information into a final product. This approach might explain the redundancy found in some of the species accounts and the inclusion of information not relevant to Southeastern wildlife (e.g., a description of elk (?) biology is nearly a page long yet the same attention is not given the much more common white tail deer). A typical problem involves the helpful "similar species" section of a species account. Although this section is included for mammalian species, there is no such information provided for insects, arachnids, or other invertebrates (though it is needed). Unfortunately irregularities like this raise doubts in the reader's mind about the validity of the information being provided and whether thorough research has been applied to all the subjects covered.

Even with these problems, Bachleda's guidebook should prove useful to any Southeastern field biologist. The objective description of outdoor products and first aid procedures makes the book worth buying. Bachleda's coverage of the snakebite treatment debate is especially even-handed and informative. Admittedly, there are sections in the guidebook that might frustrate some biologists, such as the mosquito-control suggestion to stock ponds with "top minnow [*sic*] *Gambusia affinis* or the common goldfish". In general, though, *Dangerous Wildlife in the Southeast* is a good source of practical and up-to-date information on human-wildlife interactions. Perhaps most beneficial is the guidebook's goal to inform non-scientist readers about the realities of interacting with Nature. If readers can grasp the philosophy "that every snake is not a venomous snake, and for that matter, every venomous snake does not automatically deserve to die," then the people and wildlife of the Southeast will have a brighter future of coexistence.

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